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10/779,781

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Ji-Yong Park

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H.C. PARK & ASSOCIATES, PLC  
8500 LEESBURG PIKE  
SUITE 7500  
VIENNA, VA 22182

EXAMINER

LANDAU, MATTHEW C

ART UNIT

PAPER NUMBER

2815

DATE MAILED: 09/05/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/779,781

Applicant(s)

PARK ET AL.

Examiner

Matthew Landau

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 17 July 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 2-48 is/are pending in the application.
- 4a) Of the above claim(s) 2,5-7,9-12 and 14-46 is/are withdrawn from consideration.
- 5) ☒ Claim(s) 3,4,8 and 13 is/are allowed.
- 6) ☒ Claim(s) 47 and 48 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- ☐ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: \_\_\_\_\_

## DETAILED ACTION

### *Election/Restrictions*

Claims 2, 5-7, 9-12, and 14-46 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention/species, there being no allowable generic or linking claim. Election was made **without** traverse during the telephone conversation with Hae-Chan Park (Reg. #50,114) on June 21, 2005, and was confirmed in the reply filed 9/27/2005.

### *Claim Rejections - 35 USC § 112*

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 47 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Regarding claim 47, the limitations “an average number of grain boundaries of polycrystalline silicon which are formed in an active channel region of the driving thin film transistor” and “an average number of grain boundaries of polycrystalline silicon which are formed in an active channel region of the switching thin film transistor” render the claim indefinite. It is unclear how a single channel region can have an average number of grain boundaries. The claim defines one driving thin film transistor and one switching thin film

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transistor. Since there is only one driving thin film transistor, it would be improper to say that the transistor has an “average” number of grain boundaries. A single transistor has a definite number of grain boundaries. In order to have an average, there must be more than one.

***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 48 is rejected under 35 U.S.C. 102(b) as being anticipated by Zhang et al. (US Pat. 5,614,733, hereinafter Zhang).

Regarding claim 48, Figure 3 of Zhang discloses a flat panel display device (liquid crystal display) (col. 1, lines 49-51) comprising: a pixel portion 3 divided by gate lines and data lines (not labeled) and equipped with thin film transistors (TFTs) (col. 1, lines 53-60) driven by signals applied by the gate lines and data lines; and driving circuit portion 2 comprising TFTs (col. 1, lines 53-60) connected to the gate lines and data lines respectively to apply signals to the pixel portion. It is inherent that the average number of grain boundaries in the channel regions of the driving TFTs that meet a current direction line is more than zero, since Zhang does not disclose a crystallization method that would result in grain boundaries being exactly parallel with the current line direction. Furthermore, Zhang discloses a method of crystallizing the amorphous semiconductor film used to make the active (channel) region of the driving and pixel TFTs, wherein the crystallinity of portions used to make the channels of driving TFTs is greater than

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the crystallinity of the portions used to make the channel of the pixel TFTs, thereby enhancing the carrier mobility of the driving TFTs (col. 3, line 67 – col. 4, line 4, col. 4, lines 14-18 and 35-40, and col. 8, lines 54-62). Since, the channel regions in the driving TFTs have a greater crystallinity, it follows that they have fewer grain boundaries. Therefore, it is inherent that the average number of grain boundaries in the driving TFTs that meet a current direction line is at least one less than the average number grain boundaries in the pixel TFT that meet a current direction line.

Claim 48 is rejected under 35 U.S.C. 102(b) as being anticipated by Miyanaga et al. (US Pat. 5,705,829, hereinafter Miyanaga).

Regarding claim 48, Figures 1 and 5F of Miyanaga discloses a flat panel display device (liquid crystal display) comprising: a pixel portion divided by gate lines and data lines and equipped with thin film transistors (TFTs) (Figure 5F) driven by signals applied by the gate lines and data lines; and a driving circuit portion TFTs (Figure 5F) connected to the gate lines and data lines respectively to apply signals to the pixel portion, wherein each TFT at the driving circuit portion includes an average number of grain boundaries of polycrystalline silicon which are formed in active channel regions that meet a current direction line is more than zero and at least one or more less than the average number of grain boundaries of polycrystalline silicon which are formed in active channel region of each TFT installed at the pixel portion and meet a current direction line for a unit area of active channels. Note that Miyanaga discloses the grain boundaries in the channel of the driving (peripheral) TFT grow in a direction *approximately* parallel with the current direction (col. 2, lines 30-34) and that the grain boundaries in the

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channel of the pixel (switching) TFT grew in a direction approximately perpendicular to the current direction (col. 2, lines 34-50 and col. 8, lines 42-51). Since the crystal grains in the driving TFT are not perfectly parallel to the current direction (which would be impossible due to the somewhat random nature of crystal growth), it is inherent that at least some grain boundaries meet the current direction line. On the other hand, nearly all grain boundaries in the switching TFTs meet the current direction line since they grow approximately perpendicular to the current direction. Therefore, it is inherent that the average number of grain boundaries that meet the current direction in the driving TFTs is more than zero, but at least one less than that of the pixel TFTs.

### *Claim Rejections - 35 USC § 103*

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 47 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hiroshima et al. (US PGPub 2004/0079944, hereinafter Hiroshima) in view of Zhang.

Regarding claim 47, Figure 8 of Hiroshima discloses an organic electroluminescent device comprising switching TFTs and driving TFTs (paragraph [0068]). Hiroshima does not disclose the specific limitations regarding the average number of grain boundaries in the channel regions of the switching and driving TFTs. Figure 3 of Zhang discloses a flat panel display

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device (liquid crystal display) (col. 1, lines 49-51) comprising: a pixel portion 3 divided by gate lines and data lines (not labeled) and equipped with a thin film transistors (TFT) (col. 1, lines 53-60) driven by signals applied by the gate lines and data lines; and driving circuit portion 2 comprising a TFT (col. 1, lines 53-60) connected to the gate lines and data lines respectively to apply signals to the pixel portion. As stated above, Zhang inherently discloses the average number of grain boundaries in the driving TFTs that meet a current direction line is at least one less than the average number grain boundaries in the pixel TFT that meet a current direction line. In view of such teaching, it would have been obvious to the ordinary artisan at the time the invention was made to modify the invention of Hiroshima by including the TFT structures of Zhang for the purpose of obtaining low leakage current pixel TFTs and a high current mobility driving TFTs (col. 4, lines 35-40).

Claim 47 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hiroshima in view of Miyanaga.

Regarding claim 47, Figure 8 of Hiroshima discloses an organic electroluminescent device comprising switching TFTs and driving TFTs (paragraph [0068]). Hiroshima does not disclose the specific limitations regarding the average number of grain boundaries in the channel regions of the switching and driving TFTs. Figures 1 and 5F of Miyanaga discloses a flat panel display device (liquid crystal display) comprising: a switching TFT for transmitting data signals; and a driving TFT for driving the display device so that a certain amount of current flows through the device according to the data signals, wherein an average number of grain boundaries

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of polycrystalline silicon which are formed in active channel regions of the driving TFT and meet a current direction line is more than zero and at least one or more less than the average number of grain boundaries of polycrystalline silicon which are formed in active channel regions of the switching TFT and meet a current direction line for a unit area of active channels (see above rejection of claim 48). In view of such teaching, it would have been obvious to the ordinary artisan at the time the invention was made to modify the invention of Hiroshima by including the TFT structures taught by Miyanaga. The ordinary artisan would have been motivated to modify Hiroshima in the manner described above for the purpose of obtain an organic electroluminescent display wherein the OFF current of the switching TFT is minimized and the current mobility in the driving TFT is increased (col. 8, lines 42-53).

#### ***Allowable Subject Matter***

Claims 3, 4, 8, and 13 are allowed.

The reasons for allowance were provided in the Office Action mailed on November 7, 2005.

#### ***Response to Arguments***

Applicant's arguments filed July 17, 2006 have been fully considered but they are not persuasive.

It is noted that Applicant amended claim 48 to overcome the 112, 2<sup>nd</sup> paragraph rejection. However, claim 47 was not amended. Applicant instead argues, "Each active channel region of



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each TFT includes a plurality of primary and secondary grain boundaries. Therefore, each active channel region of each TFT includes more than one grain boundary, where an average number of grain boundaries of polycrystalline silicon could be determined”. However, as stated in the above rejection, a single TFT has a definite number of grain boundaries, not an average. In order to have an average, there must be more than one TFT. It is suggested Applicant amend claim 47 in the same manner as claim 48 has been amended.

Applicant argues regarding claim 48 that “the Examiner fails to provide a basis in fact and/or technical reasoning to reasonably support the determination that the allegedly inherent characteristic necessarily flow from Zhang.” However, as indicated in the above rejection, the Examiner has provided a basis in fact and/or technical reasoning as to why the characteristic is inherent. Applicant may disagree with that reason, but to say the Examiner provided no reason is improper. Applicant further argues that the Examiner cites certain portions of Zhang, “incorrectly concluding that the crystallinity of the portions used to make the channels of the driving TFT is greater than the crystallinity of the portions used to make the channels of the pixel TFT”. However, Applicant has not provided any reasoning as to why the Examiner was allegedly incorrect. It is clear from the portions of Zhang cited in the above rejection that the crystallinity of the channel regions in the driving TFTs is in fact greater than in the switching TFTs. Since the crystallinity is greater, there are fewer grain boundaries in the driving TFTs. Therefore, there are fewer grain boundaries that meet the current direction line. Once again, the Examiner has provided a basis in fact and/or technical reasoning to reasonably support the determination that the allegedly inherent characteristic necessarily flows from the teachings of

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the applied prior art. Therefore, the burden is on Applicant to show the prior art product does not necessarily or inherently possess the characteristics of the claimed product (see MPEP 2112(V)).

Regarding the rejection of claim 48 over Miyanaaga, Applicant makes the same argument that “the Examiner fails to provide a basis in fact and/or technical reasoning to reasonably support the determination that the allegedly inherent characteristic necessarily flow from Miyanaaga.” Once again, the above rejection does provide a basis in fact and/or technical reasoning as to why the characteristic is inherent. Since the Examiner has provided a basis in fact and/or technical reasoning to reasonably support the determination that the allegedly inherent characteristic necessarily flows from the teachings of the applied prior art, the burden is on Applicant to show the prior art product does not necessarily or inherently possess the characteristics of the claimed product (see MPEP 2112(V)).

### ***Conclusion***

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37

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CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Matthew C. Landau whose telephone number is (571) 272-1731.

The examiner can normally be reached from 8:30 AM - 5:30 PM. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kenneth Parker can be reached on (571) 272-2298. The fax phone numbers for the organization where this application or proceeding is assigned are (571) 273-8300 for regular communications and (571) 273-8300 for After Final communications.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should any questions arise regarding access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



KENNETH PARKER  
SUPERVISORY PATENT EXAMINER

Matthew C. Landau

August 28, 2006